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Affinity based nanoparticles for quartz crystal microbalances sensors for thromboplastin time of Human whole blood

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Abstract

Appropriate instrumentation is the fundamental requirement for the challenging biosensing in clinical and pharmaceutical applications. This factor becomes substantially crucial while developing new methods employing conventional techniques such as QCM (Quartz Crystal Microbalances) sensors. In this regard, recently a breakthrough has been achieved by a German company 3T GmbH & Co.KG, Tuttlingen by manufacturing qCell T. The instrument can equally be applied for liquid and gas phase sensing of analytes using QCM as potential transducer in mass sensitive measurements. Employing the instrument together with proper sensor layers on QCM transducers in mass sensitive measurements can reveal the hidden truths of bioanalytes that have not been possible through conventional or handmade set ups. In clinics the measurement of the coagulation time (thromboplastin time PT) is an example of primary significance during extensive surgery, dialysis or innate disorder of hemostasis. In the past attempts have been made to study coagulation times of human whole blood and plasma using thin films [1] or nanoparticles (NPs) [2] for adhesion of blood thrombus to QCM sensor surface. But no clear picture revealing the exact correlation with standard mechanical coagulometers has been achieved until now [3]. We here report about the application of affinity based poly ethylene NPs as sensing layer for human whole blood coagulation times in real time measurements by employing qCell T. With this powerful tool we could detect coagulation times ranging from a few seconds to tens of seconds by applying blood samples of different coagulation times via using heparin or buffer dilutions. An excellent correlation of QCM sensor based measurements to standard mechanical coagulometers could be achieved.

Biography

Dr. Munawar Hussain has completed his PhD in July 2011 from University of Vienna, Austria and post doctorate in September 2012. He is post doctoral student at Biosensor Research Group, Institute of Clinical and Experimental Transfusion Medicine, University of Tuebingen, Germany. Martin Zeilinger is Ph.D student at University of Vienna, Austria. Peter A. Lieberzeit is Professor at Department of Analytical Chemistry, University of Vienna, Austria. Hinnak Northoff is Professor and head of the Institute of Clinical and Experimental Transfusion Medicine, University of Tuebingen, Germany. Frank K. Gehring is the Head of Biosensor Research Group, University of Tuebingen, Germany.

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